

IS THE SOUTHERN GREEN SHIELD BUG, *NEZARA VIRIDULA* (L.) (HEMIPTERA: PENTATOMIDAE) ANOTHER SPECIES COLONISING BRITAIN DUE TO CLIMATE CHANGE?

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ABSTRACT

Adults of the shield bug *Nezara viridula* (L.) have been regularly recorded in the UK as casual imports with vegetable produce. In the summer of 2003, three breeding populations of the species were discovered outdoors. These included 25 fourth and fifth instar nymphs found at Camley Street Natural Park in King's Cross, London, on 22 September 2003. While previously it was thought that establishment of the species in the UK was unlikely, it may be that it is currently in the process of colonising as a result of climate change and warmer annual temperatures.

BRITISH BREEDING RECORDS

There are 27 known casual records of the Southern Green Shield Bug, *N. viridula* (also referred to as the Green Vegetable Bug or Southern Green Stink Bug) in the UK, most from on or around fruit and vegetable groceries; three were found on tropical plants and two were on aircraft. There has only been one record of an egg mass being imported, on green beans (Barclay, 2003).

On 23 August 2003 two *N. viridula* nymphs were collected from a garden at Kingswood Avenue, Queen's Park, London, where they had been observed feeding on unripe tomatoes. Further investigations revealed nymphs on tomatoes in a nearby garden at Summerfield Avenue. These records are detailed in full by Barclay (op. cit.).

On 22 September 2003 the authors were visiting Camley Street Natural Park (London Wildlife Trust) near King's Cross Station (TQ2983). Approximately 25 fourth and fifth instar nymphs of *N. viridula* were observed and photographed by the authors feeding on small bushes of Wayfaring tree, *Viburnum lantana* L. The identification of the shield bug was confirmed by Bernard Nau who visited the reserve on 27 September and observed several of the nymphs. A number of specimens were taken into captivity and after 5–8 days the fifth instar nymphs transformed into adults of the standard green colour form.

IDENTIFICATION

The nymphs of *N. viridula* are very attractive and distinctive. From at least the second instar onwards each segment of the dark abdomen has four large white spots creating four lines of white spots along the abdomen, although in some specimens the outer two lines can be fainter than the central two lines. The fifth instar nymphs are further distinguished by a red spot on the margin of every abdominal segment. Unlike the earlier nymphs that are blackish brown, the fifth instars have a variable amount of brown or green pigmentation.

The adults of *N. viridula* are larger than adults of any currently resident species of shield bug (Pentatomidae). At first glance the species is very similar to the Green



Fig. 1. Fifth instar Southern Green Shield Bug, *Nezara viridula*, Camley Street Natural Park, 22 September 2003. Photo: R. Taylor.

Shield Bug, *Palomena prasina* (L.). However, the apex of the forewing is unpigmented, creating a pale green appearance to the apex in contrast to the usually darker, brown apex of *Palomena*. In addition, *N. viridula* has three diagnostic small white specks along the anterior margin of the scutellum. In some continental individuals of *N. viridula* the body is outlined by a creamy white margin.

DISCUSSION

The Southern Green Shield Bug, *N. viridula* is said to have originated in Ethiopia, or possibly the Mediterranean region, and from there to have spread throughout Europe, Asia, Africa, North and South America, Australia and New Zealand (CAB International, 2003). It is a highly polyphagous species and can reach pest levels of abundance in warmer countries, including Italy, on a range of crops including tomatoes, pecans, potatoes, cotton, grapes, beans, cabbage, citrus, cucurbits, cannabis, macadamia nuts, mango, orchids, peppers, soybeans and watercress.

The bug overwinters as an adult, hiding in locations that give protection from cold weather. In spring the adults emerge and start feeding and ovipositing. Adults are most commonly encountered in spring and late autumn, but in warm climates *N. viridula* can have up to five generations per year (Drees & Jackman, 1999). In temperate climates, the induction of diapause in populations is controlled by photoperiod and associated with a seasonal polyphenism: adults change body colour from green to brown (Todd, 1989; Musolin & Numata, 2003).

The numbers of nymphs recorded at Camley Street and the other two London localities six kilometres to the west are most likely to be the result of a number of egg masses being laid. It would seem probable that these egg masses were produced as a result of at least one previous generation; however, a series of importations of pregnant females or egg masses cannot be completely ruled out.

The last report of the Intergovernmental Panel on Climate Change stated that 'the Earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities' (Watson *et al.*, 2002). Climate change is resulting in significant changes to the British invertebrate fauna. Species already present in the UK such as Roesel's Bush Cricket *Metrioptera roeselii* (Hagenbach) and the Bee Wolf *Philanthus triangulum* (F.) have rapidly increased their ranges, apparently in response to a more favourably warm climate for them in the UK. While species such as the Rosemary Beetle *Chrysolina americana* (L.), the Median Wasp *Dolichovespula media* (Retzius), the bumblebee *Bombus hypnorum* (L.), the tamarisk bugs *Tuponia brevirostris* Reuter and *T. mixticolor* (A. Costa), Small Red-eyed Damselfly *Erythronna viridulum* (Charpentier) and the Southern Oak Bush Cricket *Meconema meridionale* A. Costa have expanded their range to include the UK, some species, such as Red-veined Darter *Sympetrum fouscolombii* (Selys) and the Queen of Spain Fritillary *Issoria lathouia* (L.) have become established temporarily but then disappeared again.

In a period before known global warming Southwood and Leston (1959) listed *N. viridula* as a foreign species and added that it was 'unlikely to become established'. It remains to be seen whether the recent changes to climate and the adaptability of *N. viridula* are sufficient for the species to survive the winter and become an established UK resident. If it does achieve this, there is a possibility that it could become a pest of new crop types grown in a future Britain.

New arrivals to the British fauna are welcomed with a series of papers in national journals. Species with burgeoning national distributions are referenced widely in local and specialist natural history journals. The newspapers get justifiably worried and excited by the prospect of new pests and diseases attacking from the south. Amid the noise there is little concern expressed about those species near their southern distribution limit in the UK, particularly those restricted to northern regions of England and Scotland (which includes many distinct isolated upland forms). A slight rise in mean annual temperatures may result in a significant northward or altitudinal retreat of cooler-adapted species, resulting in eventual extinction. The extinction of an invertebrate species is usually a quiet affair since one is almost invariably unaware that one has just contributed the 'last British record'; a slow conclusion is reached, often over several decades. We can only hope that in 100 years' time we associate this period of climate change with the addition of interesting new species and not tragic losses amongst our northern and water-dependent invertebrate faunas.

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REFERENCES

- Barclay, M. V. L. 2003. The Green Vegetable Bug *Nezara viridula* (L., 1758) (Hemiptera: Pentatomidae) new to Britain. *Entomologist's Record and Journal of Variation*, in press.

- CAB International 2003. Crop Protection Compendium CD-Rom.
- Drees, B. M. & Jackman, J. 1999. *Field Guide to Texas Insects*. Gulf Publishing Company, Houston, Texas.
- Musolin, D. L. & Numata, H. 2003. Photoperiodic and temperature control of diapause induction and colour change in the southern green stink bug. *Nezara viridula*. *Physiological Entomology* **28**:65–74.
- Southwood, T. R. E. & Leston, D. 1959. *Land and Water Bugs of the British Isles*. Frederick Warne, London.
- Todd, J. W. 1989. Ecology and behaviour of *Nezara viridula*. *Annual Review of Entomology* **34**:273–292.
- Watson, R. T. & the Core Writing Team 2002. *Climate Change 2001: Synthesis Report*. Cambridge University Press.

BOOK REVIEW

Essex Parks by M. W. Hanson & Records and Members of the Essex Field Club, 2004. 180 pp + 8 colour plates, card covers. £12.50. ISBN 0-905637-17-8. Available from: Essex Field Club, c/o School of Health & Biosciences, University of East London, Romford Road, Stratford, London E15 4LZ. www.essexfieldclub.org.uk.

This book is divided into two sections. The first provides an overview of the historic parklands of Essex, while the second part—twice as long—is about Hylands Park, near Chelmsford in Essex. It is a very interesting and unusually integrated county study of all aspects of historic parks—cultural history as well as natural history. This recognition of the multi-disciplinary interest of historic parklands is a rarity—it is excellent that the Essex Field Club has done something that the National Trust has proved incapable of doing!

The main interest of the book to BENHS members will be the sections on the Diptera (Del Smith & Mark Hanson), Coleoptera (Peter Hammond & Mark Hanson), Hymenoptera (P. R. Harvey & M. W. Hanson), Araneae (P. R. Harvey & M. W. Hanson) and other invertebrates of Hylands Park, based on a three year survey (2000–2003) plus Mark Hanson's discussion of the veteran trees and saproxylic invertebrates. Mark picks out *Callicera spinolae* Rondani and *Psilota anthracina* Meigen (Diptera: Syrphidae), *Lestes dryas* (Kirby) (Odonata) and *Trocheta subviridis* Dutrochet (Hirudinea) as the most notable invertebrates present—there is even a colour plate of the *Callicera*.

Overall, Hylands Park has produced records of 59 nationally scarce or Red Data Book invertebrates and deserves to be better known amongst invertebrate specialists. These species with special conservation status are listed in a separate section which identifies Hylands as one of the most important wood-pasture sites in Essex, outside of the better known Epping, Hatfield and Hainault Forests. Although not of national significance, on present knowledge, Hylands is clearly of county if not regional importance for its saproxylic invertebrates.

There is clearly much still to be found in this site—if a list of a mere eleven fungus gnats is anything to go by—and even the 79 hoverfly species recorded leaves some scope for additional species in that well-studied group. Coleoptera are also still under-recorded—can *Rhagonycha fulva* (Scopoli) truly be absent? There is no moth list at all—a serious challenge to local BENHS members. Compilations such as this are still rare in Britain and this example should hopefully spur on other naturalists to make their own mark in the literature.

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